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Federal Government Infrastructural Spending, Agricultural Output and Economic Growth in Nigeria (1981-2020)

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Abstract

The research investigated the relationship among federal government infrastructural spending, agricultural output, and economic growth in Nigeria. Secondary data were sourced from the Statistical Bulletin of the Central Bank of Nigeria (CBN), on government expenditure on infrastructure, government expenditure on agriculture, agricultural output, and real gross domestic product.

Data were analyzed with the Augmented Dickey-Fuller (ADF), Johansen co-integration, Vector Autoregressive (VAR), and Granger Causality techniques. The Johansen co-integration revealed there was no long-run relationship among variables; the VAR result revealed that infrastructural spending and agricultural output have a positive effect on the economic growth of Nigeria. The Granger Causality revealed that there was a unidirectional relationship between infrastructural spending and economic growth while bi-directional causality exists between agricultural output and economic growth in Nigeria within the period under review.

The research concluded that infrastructural investment and agricultural output had a significant and positive effect on the economic growth of Nigeria within the period under review. The study therefore recommends that the government of Nigeria should improve its spending on infrastructure and substantial financial allocation should be devoted to the agricultural sector of the country in order to boost economic growth in the country.

Keywords: Infrastructural spending, government expenditure, agricultural output, Gross domestic products, Nigeria

1. INTRODUCTION

Governments around the world are continually seeking strategies to increase the ability of their economies to produce more goods and services. Thus, attention has shifted to infrastructure development as a veritable tool for raising the productive capacity of the economy. Infrastructure plays a very important role in the growth process of an economy. In fact, development economists have considered infrastructural spending as a precondition for industrialization and economic development (Sawada, 2015). Policymakers believe that appropriate infrastructural investment holds the key to social and economic growth and development. According to the World Bank (2007), improving infrastructure in the world is key to reducing poverty, increasing growth, and achieving the Millennium Development Goals (MDGs). The need for infrastructure development is indeed crucial for developing countries, especially in Africa. The lack of modern infrastructure has been regarded as an impediment to economic development and a major constraint not only on poverty reduction but also on the attainment of the Millennium Development Goals (MDGs) in SSA countries (Habitat, 2011).

Some economic scholars, however, hold a mixed view about the consequences of infrastructure development. One of the views about infrastructural investment is that a high rate of infrastructure growth raises the level of productivity in the current period, and also leads to a higher potential level of output for the future (Koner *et al,* 2012). The argument in opposition is that rapid infrastructural development leads to an unbalanced form of development process (Koner *et al*, 2012).

There have been a number of valuable studies on the role of infrastructure in an economy both within Nigeria, Africa, and around the world. Amongst these studies are those that focused on the relationship between infrastructure and agricultural output (Clement and Ighodaro, 2011).

Agriculture's influence on the growth of an economy cannot be over-emphasized. It serves as a source of food as well as the provision of foreign exchange earnings for the economy, Onuze (2012). Prior to independence, the Nigerian economy was principally an agrarian economy because agriculture was the engine of growth of the overall economy (Akintunde, 2013). In developing countries particularly Africa, agriculture serves as the mainstay of the continent and the public sector absorbs a relatively large share of the country's economic resources. The development process itself leads to a variety of economic activities which in turn leads to further growth in the economy (Ighodaro, 2010).

CBN (2000) defined agriculture as the business of managing a farm for the production of crops, staples, livestock, fishing, and forestry. Samuelson and Nordhaus (2003) posited that agricultural outputs are various useful goods and services produced to be consumed or used for further production. Therefore, with regard to this research work, agricultural output refers to the amount of agricultural yields produced within a given time.

The role of infrastructural spending in economic growth has been a subject of discourse in economic literature. There are arguments that the development of modern nations to their full potential can never be attained without adequate infrastructure investments and a sure way of doing this is through enhanced investment spending. Much of the debate on ways to spur growth, reduce poverty, and achieve other sustainable development goals (SDGs) is centered on the need to promote public infrastructural investment (World Economic Forum 2017).

Economic growth is an increase in the country productive capacity, when measured up to one period of time to another. Therefore, growth in an economy is seen when the total output of goods and services increases when measured with the previous years (Favour *et al*, 2017).

Despite many reforms introduced by various governments to boost agricultural growth and its effect on the economy, agricultural output has yielded the desired growth to achieve the Millennium Development Goals. Many studies have used different methods to indicate the contribution of agricultural output to economic growth.

Public expenditure on infrastructure has been of much concern to several scholars. Inspite of the visible attempts by successive governments in Nigeria to commit a lot of financial resources, there seems to be what has been referred to as 'the paradox of plenty' because infrastructural facilities in the country are deteriorating into horrible states of disrepair.

Existing studies have examined the impact of agricultural output on economic growth, but there inadequate studies linking federal government investment on infrastructures with agricultural sector output and economic growth in sub-Saharan African countries, especially the case of Nigeria. Infrastructural investment has been found to be an important issue in agricultural productivity which in turn lead to economic growth and development. While acknowledging studies on the impact of infrastructure spending on the growth of Nigeria economy, there is a need to provide an empirical insight into federal government expenditure on infrastructural development and economic growth in Nigeria which previous studies have not considered or perhaps inconclusive.

In view of the above, the research questions are: What is the impact of infrastructural spending and agricultural output on economic growth in Nigeria? What is the causal relationship among infrastructural spending, agricultural output and economic growth in Nigeria? The research hypotheses are to examine if infrastructural spending, agricultural output do not have any significant effect on economic growth in Nigeria and to test if there is no causal relationship among infrastructural spending, agricultural output and economic growth in Nigeria.

The justification of the study is based on the mantra that agricultural sector output will enable a country to feed its growing population, earn foreign exchange and provide raw materials for industries in Nigeria. The research work will also be a valuable source of literature for researchers, students, government agencies, and those interested in knowing much about the relationship between infrastructural spending, agricultural output, and economic growth in Nigeria.

2. Literature Review

Theoretical Review

Development economists have focused on how agriculture can meaningfully contribute to overall economic growth and development. The physiocrats believed that the fate of the economy is regulated by productivity in agriculture and its surplus is diffused throughout the system in a network of transactions. The agricultural sector to the physiocrats is the only genuinely productive sector of the economy and the generator of surplus upon which all depends.

Todaro and Smith (2003), while looking at Lewis theory of development, assumed that underdeveloped economies consist of two sectors. These sectors are the traditional agricultural sector characterized by zero marginal labour productivity and the modern industrial sector. The primary focus of the model is the labour transfer and the growth of output and employment in the modern sector. Todaro and Smith (2003) argued further that, if development is to take place and become self-sustaining, it will have to include the rural area in general and the agricultural sector in particular.

Rostow (1960) as cited in Oji-Okoro (2011) argued that in the process of economic development, nations pass through several stages namely: the traditional stage, the precondition for take-off, the take off stage, drive to maturity and the high mass consumption stage. Agriculture played crucial roles in the first three stages (Traditional society, pre-conditions for take-off and take-off stages). The agricultural sector has the potential to be the industrial and economic springboard from which a country's development can take off. Indeed, more often than not, agricultural activities are usually concentrated in the less- developed rural areas where there is a critical need for rural transformation, redistribution, poverty alleviation and socio-economic development.

It is important to highlight some studies that have examined the effect of infrastructures on agricultural output in the Nigerian economy and elsewhere. For instance, Olajide, *et al* (2012) and Ighodaro (2010), were among the studies that examined the effect of telecommunication on agricultural output and it was found that positive relationship existed between them. Felloni, *et al* (2001) investigated the effect of modern facilities on agricultural output using data from 83 countries and 30 Chinese provinces. The study revealed that for both cross-country and specific-country analyses, energy, and transport as well as a combination of both have a positive impact on aggregate agricultural productivity. Electricity was reported to be very important when animal production and processing were involved.

Llanto (2012) had empirical evidence indicating a significant link between rural infrastructure and agricultural productivity. Electricity and roads are significant determinants of agricultural productivity with rural roads providing important connectivity with growing markets and lessening input costs and transaction costs of rural producers and consumers. Access to electricity also creates opportunities for rural households to earn income. Watson (2013) conducted a study in Zimbabwe which revealed that poor state of roads, lack of electricity, and poor cellular networks led to excessive losses on perishable market gardening produce, shunning of the area by extension workers, communication difficulties, and delay in reception of essential inputs. In Pakistan, an attempt was made by Nadeem, *et al* (2011) to quantify the impact of public infrastructure on total factor productivity and Ewetan, Fakile, Urhie and Oduntan (2017) also found that the agricultural sector contributed positively to the economic growth in Nigeria.

Nasir, Khalid & Mohammad (2011) studied public infrastructure (both social and physical) investment on total factor productivity in Punjab, Pakistan using the multivariate Cobb- Douglas production function for the period 1970- 2005. The results showed that public investment on physical infrastructure (rural roads, village electrification, and irrigation) and social infrastructure (rural education and rural health) contributed significantly and positively to total factor productivity. The study suggested that more resources should be diverted toward the development of physical and social infrastructure that will enhance agricultural productivity as well as reduce rural poverty.

Fungo, Krygsman and, Nel (2017) investigated and empirically quantified the impact of improved rural accessibility on agricultural production of Tanzanian smallholder farmers. Using the Tanzania National Panel Survey (NPS) data of 2012/13, the relationship between transport price, access to the market, and crop yield was established. The results showed a positive impact on crop yield following the reduction of transport price with an elasticity of -0.291.

Soumya and Elumalai (2015) empirically investigated the relationship between rural infrastructure and agricultural productivity in the state of Karnataka. The analysis was carried out among the districts of Karnataka for the period of 1980-2010. The utilization of these infrastructures had not been considered for explaining the differences in productivity.

Stephen (2015) investigated the influence of road transportation infrastructure on rural agricultural development in the Jaman South District of the Republic of Ghana. The study adopted a cross-section survey research design. Purposive sampling was used to select 30 rural communities while questionnaires and structured interview schedules were used to collect data from 387 farmer households and 84 drivers by means of a simple probability sampling technique. The study established that less than 45% of the road network in the district was properly engineered and classified to be good. It was found that, the average farm distance from the community to the main road or nearest market was approximately 2,500m out of which approximately 1,375m was in bad shape. The study recommended the development and expansion of road infrastructure in Jaman South District making use of local resources and technology to boost agricultural development which will further augment farmers" income and general well-being.

Suryani *et al*. (2015) analyzed rural road infrastructure on the supply of output and the demand for inputs in food crops in Indonesia between 2007 and 2010. Multi-input multi-output approach with a translog-profit function was adopted as the method of analysis. The results of the study revealed that the elasticity of the supply of output and the demand for inputs on rural road infrastructure was inelastic. The study therefore recommended that government should increase its budget allocation to maintain and improve road infrastructure, especially in the area of food crop production.

Adefalu, Olorunfemi and Olatinwo (2015) investigated poor road transportation network on crop production in one of the rural agrarian local government of Kwara State, Nigeria. A well-structured interview schedule was conducted to elicit information from 120 crop farmers using a two-stage sampling technique. Findings from the study revealed that the poor road transportation network in their area had led to a reduction in their income, longer time in transporting produce to more buoyant markets, as well as incurring high transportation costs.

Soumya and Elumalai (2017) examined rural infrastructure on agricultural development in the Southern Indian State of Karnataka. The study used district-level data for 30 years period and employed infrastructure availability and utilization framework to examine the relationship between the rural infrastructure and agricultural development. The regression analysis showed that infrastructure availability index and infrastructure utilization index had positive and significant effect on agricultural productivity growth.

3. METHODOLOGY

Theoretical framework

This study adopts the Solow-Swan theory of economic growth which states that economic growth occurs as a result of three factors- labor, capital, and technology. While an economy has limited resources in terms of capital and labor, the contribution from technology to growth is boundless.

Solow-Swan neoclassical growth theory posits that the potential rate of growth of output which represents the equilibrium and natural rates of growth is determined exogenously by the rate of growth of the labor force and technological progress. The focus of the theory is on the reconciliation of the actual and natural rates of growth. It is a simple structure of a well-behaved production function, investment-saving relation, and a labor growth function. In Solow's model, the growth process follows a balanced growth path. According to Solow (1956), output per worker along the balanced growth path is determined by technology, investment rate, and the population growth rate, and growth in output and in the volume of international trade are closely related. However, Solow emphasized the importance of technological change in the long-term economic growth rate but what determines technological progress was left unanswered and assumed to be exogenous (Barro and Salai-i-Martin, 2004).

Types and sources of data

Annual data for the period were collected from secondary source that is the Annual Reports and Statement of Accounts and the Statistical Bulletin of the CBN. The variables used in the model included RGDP, GINFR, GEA, and AGT.

Model specification

The model specification of this study follows the work of Olajide, Akinlabi and Tijani (2012), and the model is specified as shown below:

The model can be implicitly given as:

$RGDPt = f\,(GINFRt, GEAt, AGTt)$ ………………………………………………………………………….. (3.1)

Expressing equation 3.1 Explicitly in econometric form gives;

$RGDPt = \alpha_0 + \beta_1 GINFR_t + \beta_2 GEA_t + \beta_3 AGT_t + \varepsilon_t$ ……………………………..………………………….. (3.2)

Expressing Equation (3.2) in a natural logarithm form ;

$LnRGDP_t = \alpha_0 + \beta_1 lnGINFR_t + \beta_2 lnGEA_t + \beta_3 lnAGT_t + U_t$ …………………………............................ (3.3)

Where;

RGDP = Real gross domestic product which represents economic growth (₦`billion)

GINFR = Government Expenditure on infrastructure (₦`billion)

GEA = Government expenditure on agriculture (₦`billion)

AGT = Agricultural output (₦`billion)

α_0 = Intercept

β_1- β_3 = Parameters to be estimated

ε_t =Error term

Ln = Natural logarithm

t = 1981-2020 (40 years)

Estimation procedure

Inferential techniques were employed to examine the effect of federal government infrastructural spending and agricultural output on economic growth during the period under review.

The ADF unit root tests were employed to ascertain the stationarity properties of the variables. The lag length selection criteria were used to determine the appropriate lag for the model, the Johansen co-integration test was used to check for long-run relationships among the variables. The VAR model was used to analyze the relationship among the variables employed in the study. The Wald test was used to detect the joint significance of the independent variables on the dependent variable. Lastly, Granger causality was used to test for the direction of causal relationship among the variables of interest.

VAR model

The unit root test result showed that all variables were stationary at first difference and it was established from the Johansen co-integration test that there was no long-run relationship among the variables, then, proceeded to estimate the VAR model to check the effect of the independent variables on the dependent variables.

The VAR model is therefore specified as below:

$\Delta lnRGDP_t = \alpha_0 + \alpha_1\sum\Delta lnRGDP_{t-1} + \alpha_2\sum\Delta lnG\_INFR_{t-1} + \alpha_3\sum\Delta lnGEA_{t-1} + \alpha_4\sum\Delta lnAGT_{t-1} + U_{1t}$ …………… (3.4)

$\Delta lnG\_INFR_t = \beta_0 + \beta_1\sum\Delta lnG\_INFR_{t-1} + \beta_2\sum\Delta lnRGDP_{t-1} + \beta_3\sum\Delta lnGEA_{t-1} + \beta_4\sum\Delta lnAGT_{t-1} + U_{2t}$ …………(3.5)

$\Delta lnGEA_t = \phi_0 + \phi_1\sum\Delta lnGEA_{t-1} + \phi_2\sum\Delta lnRGDP_{t-1} + \phi_3\sum\Delta lnG\_INFR_{t-1} + \phi_4\sum\Delta lnAGT_{t-1} + U_{3t}$ ………………(3.6)

$\Delta lnAGT_t = \mho_0 + \mho_1\sum\Delta lnAGT_{t-1} + \mho_2\sum\Delta lnRGDP_{t-1} + \mho_3\sum\Delta lnG\_INFR_{t-1} + \mho_1\sum\Delta lnGEA_{t-1} + U_{4t}$…………….(3.7)

α, β, ϕ, and Ʊ = Parameters to be estimated

Granger causality test

The model was used to test the direction of causality among the adopted variables as shown below:

$RGDP_t = \alpha_1 + \sum RGDP_{t-1} + \sum GINFR_{t-1} + U_t$ ……………………………………………………………………….(3.8)

$GINFR_t = \alpha_2 + \sum GINFR_{t-1} + \sum RGDP_{t-1} + U_t$ …………………………………………….…………………….(3.9)

$AGT_t = \alpha_1 + \sum RGDP_{t-1} + \sum AGT_{t-1} + U_t$ ……………………………………………………………………….(3.10)

$AGT_t = \alpha_2 + \sum AGT_{t-1} + \sum RGDP_{t-1} + U_t$ …………………………………………………..…………………..(3.11)

***APriori* expectation**

According to traditional Keynesian macroeconomics, government expenditure can positively contribute to economic growth through a multiplier effect on aggregate demand, Agricultural output is also expected to have positive effects on economic growth. ($\beta_1>0$, $\beta_2>0$ and β_3).

4. RESULTS

Table 1. Unit root results output

Series	Exogenous	ADF test (T- statistic) (Prob. Value) at Level	ADF test (T- statistic) (Prob. Value) at	Decision
LNRGDP	Intercept	-0.485039 (0.8832)	-3.289440 (0.0224)	I_1
LNGINFR	Intercept	-0.662600 (0.8443)	-6.886214 (0.0000)	I_1
LNGEA	Intercept	-0.894556 (0.7794)	-6.693709 (0.0000)	I_1
LNAGT	Intercept	-0.827298 (0.8001)	-6.144891 (0.0000)	I_1

Author's computation, 2022

Table 1 above revealed that none of the variables was stationary at level and that all of the variables were stationary at first difference which indicated that all variables in the model were integrated at order one, meaning they are all I_1 variables.

Table 2 Lag length selection criterion (LLSC) results

Endogenous variables: LNRGDP LNG_INFR LNGEA LNAGT
Exogenous variables: C
Date: 05/19/22 Time: 07:57
Sample: 1981 2020
Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-136.2869	NA	0.028503	7.793716	7.969662	7.855126
1	25.69002	278.9602*	8.63e-06*	-0.316112*	0.563620*	-0.009062*
2	34.85444	13.74663	1.31e-05	0.063642	1.647161	0.616333
3	44.05792	11.76000	2.09e-05	0.441227	2.728532	1.239558
4	61.07335	17.96074	2.39e-05	0.384814	3.375905	1.428785

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schw arz information criterion
HQ: Hannan-Quinn information criterion

Author`s Computation, 2022

Table 2 was carried out to determine the appropriate lag length for the model. The lag selection criteria is based on the least selected lag length by different criteria (that is Akaike Information Criterion (AIC), Schwartz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ)). Based on this, the appropriate lag length was Lag 1 which happened to be the least selected by all.

Table 3. Johansen cointegration results

Date: 05/19/22 Time: 07:59				
Sample (adjusted): 1983 2020				
Included observations: 38 after adjustments				
Trend assumption: Linear deterministic trend				
Series: LNRGDP LNG_INFR LNGEA LNAGT				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None	0.511146	42.75630	47.85613	0.1386
At most 1	0.230436	15.56001	29.79707	0.7428
At most 2	0.109111	5.606651	15.49471	0.7414
At most 3	0.031501	1.216301	3.841466	0.2701
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None	0.511146	27.19628	27.58434	0.0560
At most 1	0.230436	9.953364	21.13162	0.7491
At most 2	0.109111	4.390349	14.26460	0.8160
At most 3	0.031501	1.216301	3.841466	0.2701
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Author`s computation, 2022

Table 4. VAR Output

Date: 05/19/22 Time: 08:01				
Sample (adjusted): 1982 2020				
Included observations: 39 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
	LNRGDP	**LNG_INFR**	**LNGEA**	**LNAGT**
LNRGDP(-1)	0.907374	0.307699	-0.277378	-2.287936
	(0.04687)	(0.60378)	(0.78641)	(1.47550)
	[19.3573]	[0.50962]	[-0.35272]	[-1.55061]
LNG_INFR(-1)	0.108975	1.089662	0.756908	0.338999
	(0.03297)	(0.42470)	(0.55316)	(1.03787)
	[3.30508]	[2.56573]	[1.36834]	[0.32663]
LNGEA(-1)	-0.084480	-0.151148	0.270798	-0.070878
	(0.02683)	(0.34556)	(0.45008)	(0.84447)
	[-3.14897]	[-0.43740]	[0.60166]	[-0.08393]
LNAGT(-1)	0.009443	0.058844	0.055889	0.710460
	(0.00354)	(0.04558)	(0.05937)	(0.11139)
	[2.66860]	[1.29102]	[0.94144]	[6.37837]
C	0.668584	-3.648881	1.455637	26.06481
	(0.45655)	(5.88063)	(7.65937)	(14.3710)
	[1.46443]	[-0.62049]	[0.19005]	[1.81371]
R-squared	0.996985	0.972436	0.949455	0.856254
Adj. R-squared	0.996630	0.969193	0.943508	0.839343
Sum sq. resids	0.038311	6.356161	10.78283	37.95952
S.E. equation	0.033568	0.432372	0.563154	1.056625
F-statistic	2810.719	299.8745	159.6661	50.63206
Log likelihood	79.71029	-19.96293	-30.26927	-54.81130
Akaike AIC	-3.831297	1.280150	1.808681	3.067246
Schwarz SC	-3.618020	1.493427	2.021958	3.280523
Mean dependent	10.33126	5.075544	4.194101	13.75809
S.D. dependent	0.578261	2.463403	2.369377	2.636153
Determinant resid covariance (dof adj.)		6.90E-06		
Determinant resid covariance		3.99E-06		
Log likelihood		21.08367		
Akaike information criterion		-0.055573		
Schwarz criterion		0.797536		

Author`s computation, 2022

Table 3 revealed the properties of the variables being I (1) calls for the running of the co-integration test to check whether there is a long-run relationship among the variables. The Trace statistics and Maximum Eigenvalue further show that the null hypothesis of no co-integration among the variables was accepted. Both the Maximum Eigenvalue and Trace statistics indicated that there were no co-integrating equations respectively. This means that there exists no long-run relationship among the variables. That is, the linear combination of these variables cancelled out the stochastic trend in the series,

From Table 4, the coefficient value of one period lag of LNRGDP is 0.907374 with a t-statistic value of 19.3573, shows that there is a positive relationship between the dependent variable and its lagged value in one period and is statistically significant. It implies that a percentage increase in RGDP in one period lagged will bring about a 91 % increase in economic growth. The coefficient value of LNGINFR is 0.108975 with a t-statistics value of 3.30508 showing a positive relationship between the variable and RGDP. This implies that a percentage increase in government expenditure on infrastructure will bring about an 11 percent increase in real GDP and is statistically significant at 5%. The value of LNGEA is -0.084480 with a t-statistic value of -3.14897 showing that there was a negative relationship between the variable and RGDP and this implies that a percentage increase in government expenditure on agriculture, will bring about 8% decrease in economic growth and it is statistically significant at 5%. The value of LNAGT is 0.009443 with a t-statistics value of 2.66860 shows that there is a positive relationship between the variable and RGDP and is statistically significant at 5%. This result implies that a percentage increase in agricultural output will bring about a 0.9% increase in economic growth.
The R-Squared value 0.996985 shows that 99.7% of the total variation in the LNRGDP is explained by the explanatory variables (LNOREV, LNAGRQ, LNFDI and EXR). The F-Statistic value of 2810.719 shows the fitness of the model.

Table 5. VAR coefficients and probabilities

Estimation Method: Least Squares				
Date: 05/19/22 Time: 08:08				
Sample: 1982 2020				
Included observations: 39				
Total system (balanced) observations 156				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	0.907374	0.046875	19.35732	0.0000
C(2)	0.108975	0.032972	3.305080	0.0012
C(3)	-0.084480	0.026828	-3.148966	0.0020
C(4)	0.009443	0.003539	2.668601	0.0085
C(5)	0.668584	0.456549	1.464430	0.1454
C(6)	0.307699	0.603778	0.509623	0.6111
C(7)	1.089662	0.424699	2.565727	0.0114
C(8)	-0.151148	0.345559	-0.437400	0.6625
C(9)	0.058844	0.045579	1.291016	0.1989
C(10)	-3.648881	5.880635	-0.620491	0.5360
C(11)	-0.277378	0.786405	-0.352717	0.7248
C(12)	0.756908	0.553159	1.368336	0.1735
C(13)	0.270798	0.450081	0.601664	0.5484
C(14)	0.055889	0.059366	0.941440	0.3481
C(15)	1.455637	7.659371	0.190047	0.8496
C(16)	-2.287936	1.475504	-1.550613	0.1233
C(17)	0.338999	1.037873	0.326628	0.7445
C(18)	-0.070878	0.844471	-0.083932	0.9332
C(19)	0.710460	0.111386	6.378371	0.0000
C(20)	26.06481	14.37100	1.813709	0.0719
Determinant residual covariance		3.99E-06		
Equation: LNRGDP = C(1)*LNRGDP(-1) + C(2)*LNG_INFR(-1) + C(3)				
*LNGEA(-1) + C(4)*LNAGT(-1) + C(5)				
Observations: 39				
R-squared	0.996985	Mean dependent var		10.33126
Adjusted R-squared	0.996630	S.D. dependent var		0.578261
S.E. of regression	0.033568	Sum squared resid		0.038311
Durbin-Watson stat	1.902408			
Equation: LNG_INFR = C(6)*LNRGDP(-1) + C(7)*LNG_INFR(-1) + C(8)				

*LNGEA(-1) + C(9)*LNAGT(-1) + C(10)			
Observations: 39			
R^2	0.972436	Mean dependent var	5.075544
Adjusted R^2	0.969193	S.D. dependent var	2.463403
S.E. of regression	0.432372	Sum squared resid	6.356161
Durbin-Watson stat	2.152490		
Equation: LNGEA = C(11)*LNRGDP(-1) + C(12)*LNG_INFR(-1) + C(13)			
*LNGEA(-1) + C(14)*LNAGT(-1) + C(15)			
Observations: 39			
R-squared	0.949455	Mean dependent var	4.194101
Adjusted R-squared	0.943508	S.D. dependent var	2.369377
S.E. of regression	0.563154	Sum squared resid	10.78283
Durbin-Watson stat	2.006373		
Equation: LNAGT = C(16)*LNRGDP(-1) + C(17)*LNG_INFR(-1) + C(18)			
*LNGEA(-1) + C(19)*LNAGT(-1) + C(20)			
Observations: 39			
R-squared	0.856254	Mean dependent var	13.75809
Adjusted R-squared	0.839343	S.D. dependent var	2.636153
S.E. of regression	1.056625	Sum squared resid	37.95952
Durbin-Watson stat	1.893622		

Author`s computation, 2022

Table 5 above depicts the one-period lag of all independent variables (LNRGDP, LNGINFR, LNGEA, and LNAGT) were statistically significant at 5% with values of 0.0000, 0.0012, 0.0020, and 0.0085 respectively. The Durbin Watson Statistic always has a value between 0 and 4.0. A value of 2.0 means that there is no auto-correlation detected in the model. Values from 0 to 2.0 indicate positive auto-correlation and values from 2.0 to 4.0 indicate negative auto-correlation. In the above table, the value of Durbin Watson is 2.152490 which indicates that there was a negative auto-correlation in the model because the value lies between 2.0 and 4.0.

Table 6. Wald test output

Test Statistic	Value	Df	Probability
Chi-square	26.12117	3	0.0000
Null Hypothesis: C(2) = C(3) = C(4) = 0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		**Value**	**Std. Err.**
C(2)		0.108975	0.032972
C(3)		-0.084480	0.026828
C(4)		0.009443	0.003539
Restrictions are linear in coefficients.			

Author`s computation, 2022

Table 4.6 above depicts the Wald test used to determine the joint significance of the independent variables on economic growth. The null hypothesis that the variables do not have a joint significance on economic growth was rejected based on the probability value of the Chi-square which was 0.0000 and this implies that LNGINFR, LNGEA, and LNAGT are having a positive and significant effect on economic growth of Nigeria.

Table 7 Granger causality results

Date: 05/23/22 Time: 05:50				
Sample: 1981 2020				
Lags: 1				
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**	**Remarks**
LNG_INFR does not Granger Cause LNRGDP	39	6.43965	0.0156	Uni-directional Causality
LNRGDP does not Granger Cause LNG_INFR		0.06578	0.7990	
LNGEA does not Granger Cause LNRGDP	39	4.02555	0.0524	No Causality
LNRGDP does not Granger Cause LNGEA		0.42838	0.5169	
LNAGT does not Granger Cause LNRGDP	39	11.9395	0.0014	Bi-directional Causality
LNRGDP does not Granger Cause LNAGT		5.38043	0.0262	

Author`s Computation, 2022

As shown in Table 7 above, there was a uni-directional causality between Government expenditure on infrastructure and economic growth with a probability value of 0.0156 showing that only inflation rate granger caused RGDP. It was also reported that there is a bi-directional causality between agricultural output and

RGDP with probability values of 0.0014 and 0.0262, showing that both Agricultural output and economic growth granger caused each other.

Discussion of findings

From the findings, the research discovered that federal government expenditure on infrastructure has a significant positive effect on economic growth which conforms to the *a priori* expectation. The result agreed with the findings of (Jacoby, 2000, and Nadeem, *et al* (2013), who all discovered that federal government expenditure on infrastructure has a significant and positive effect on economic growth. The findings of Stephen (2015) discovered that there exists an insignificant effect of federal government expenditure on infrastructure on economic growth which could be a result of expenditure being incurred on infrastructure that is not driving the economy and embezzlement of the funds by some government officials

Likewise, the findings also discovered that LNGEA had a significant negative effect on economic growth. The result was in conformity with the findings of Ikwuba, (2019) which could be a result of funds not being implemented for the purpose which they were meant for. However, the result did not agree with the findings of Adisa, (2019) who discovered that government expenditure on agriculture had a significant positive effect on economic growth.

Agricultural output had a significant positive effect on economic growth in Nigeria in the period under review. The result conforms to the *apriori* expectation and Ewetan, *et. Al.* (2017), Abula and Ben (2016). Surprisingly and contrary, the result was against the finding of Karimou (2018) who discovered that aagricultural output had an insignificant negative effect on economic growth which could be attributed to the nature of data or the methodology adopted in the analysis.

It was also discovered that there exists a uni-directional causality between federal government expenditure on infrastructure and economic growth in Nigeria which supported the work of Hassan (2018) and Clement (2011) who found a bi-directional causality between agricultural output and economic growth.

Conclusion And Recommendation

The study examined the impact of infrastructural investment and agricultural output on economic growth in Nigeria. The findings concluded infrastructural investment and agricultural output have a significant positive effect on the economic growth of Nigeria within the period under review.

The study also concluded that there was a uni-directional causality between infrastructural spending and economic growth while bi-directional causality exist between AGT and economic growth within the period under review.

Based on the findings and conclusion, the following recommendations were made:

1. The federal government of Nigeria should increase its expenditure on infrastructure and there should be proper monitoring of funds provided for it in order to yield positive results and boost the economic growth of Nigeria.
2. The federal government of Nigeria should also concentrate on the agricultural sector of the country by providing substantial funds into the sector through farmers' empowerment and provision of fertilizers with a view to increasing the agricultural sector output for the economic growth of Nigeria.

References

Abula, M. and Ben, D. M. (2016).The impact of public debt on the economic development of Nigeria. *Asian Research Journal of Arts & Social Sciences, 1(1), pp.1-16.*

Adefalu L. L., Olorunfemi O.D., Olatinwo L.K. and Olatunji Y. (2015). Perceived Effects of Poor Road Transportation Network on Crop Production in Kaiama Local Government Area of Kwara State, North Central Nigeria. *International Journal of Agricultural Management and Development (IJAMAD) Available online on: www.ijamad.iaurasht.ac.ir ISSN: 2159-5852 (Print) ISSN: 2159-5860 (Online).*

Akintunde, T.(2013). An Analysis of Federal Government Expenditure and Monetary Policy on Agricultural Output in Sciences Nigeria*. Global Advanced Research Journal of Management and Business Studies 1(6): pp.310-317.*

Arthur Lewis (1954). Development with Unlimited Supplies of Labour. First published: May 1954https://doi.org/10.1111/j.1467-9957.1954.tb00021.x

Barro R. J. and Salamatin M. (2004). Economic Growth: *MITN Press Cambridge, Massachusettes; 3 (20): pp.285-311.*

CBN (2000). Conduct of Fiscal Policy- 2000 .https://www.cbn.gov.ng. Monetary Policy

Clement I. (2011). Infrastructure and Agricultural Growth in Nigeria. *Ethiopian Journal of Economics, Volume XIX, No. 2, pp23-32.*

Ewetan, O., Fakile A., Urhie, E., and Oduntan E. (2017). Impact Infrastructure and Economic Development in Nigeria. *Journal of African Research in Business & Technology, Vol. 2017. Pp. 1-11. DOI: 10.5171/2017. 516093.*

Favor, E.O., Ideniyi, O.S., Oge, E.O. and Charity, I.A. (2017). Public Debt and Economic Growth in Nigeria*. Asian Research Jou*rnal of Arts & Social Sciences. 4(3): *pp.*1-16.

Felloni, F., Wahl, T., Wandschneider, P., and Gilbert, J. (2001). Infrastructure and agricultural production: cross-country evidence and implications for China. *TW.-2001-103. Washington State University: Pullman.*

Fungo, E Krygsman, S and Nel, H.(2017). The Role of Road Infrastructure in Agricultural Production. In Washington DC 9th Transport Research Board Annual Meeting.

Habitat, U. N. (2011). Infrastructure for economic development and poverty reduction in Africa. *United Nations Human Settlements Programme, p14, h t t p : / / m i r r o r . u n h a b i t a t . org/pmss/listItemDetails. aspx.*

Ighodaro, C. A. (2010). Infrastructure and agricultural growth in Nigeria. *Ethiopian Journal of Economics, 19(2), pp.147-173.*

Iganiga BO, Unemhilin DO (2011). The Impact of Federal Government Agricultural Expenditure on Agricultural Output in Nigeria. *J. Econs*. 2(2):81-88.

Jacoby, H. G. (2000). Access to markets and the benefits of rural roads. *The Economic Journal, 110(465), pp.713-737.*

Karimou, S.M (2018). The Impact of Agricultural Output on Economic Growth in West Africa:

Case of Benin. EconPapers. 2018 Conference, July 28-August 2, 2018, Vancouver, British Columbia from International Association of Agricultural Economists https://econpapers.repec.org/RePEc:ags:iaae18:277388

Koner, J, Purandare, A and Dhume, A. (2012). An Empirical Study on the Impact of Infrastructural Development on Social and Economic Growth in Indian States. *European Journal of Economics and Management,* Vol. 4, (17): 16-25

Llanto, G. M. (2012). The impact of infrastructure on agricultural productivity (2012-12). PIDS Discussion Paper Series.

Nadeem, N., Mushtaq, K., & Javed, M. I. (2011). Impact of social and physical infrastructure on agricultural productivity in Punjab, Pakistan - A Production Function Approach. *Pakistan Journal of Life & Social Sciences*, *9*(2), *pp.*1-6.

Nasir N., Khalid M. and Mohammad I. J. (2011). Impact of Social and Physical Infrastructure on Agricultural Productivity in Punjab, Pakistan-A Production Function Approach. *Pak. J. Life Soc. Sci. (2011), 9(2): pp.153-158.*

Ngcobo, B. L. (2012). The impact of infrastructure on agricultural economic development in Bizana, Eastern Cape.

Oji-Okoro, I. (2011). "Analysis of the Contribution of Agricultural Sector on the Nigerian Economic Development." *World Review of Business Research, 1(1), pp.191 - 200.*

Olajide, O. T., Akinlabi, B. H., and Tijani, A. A. (2012). Agriculture resource and economic growth in Nigeria. *European Scientific Journal, 8(22), pp.103-115.*

Onuze, M.T. (2012). The Impact of Agricultural Development on Nigeria Economic Growth (1980 -2010). Enugu State.

Palwinder S. and Jasmindeep K. (2014). Role of Infrastructure in the Growth of Agriculture in Punjab. *IOSR Journal of Economics and Finance Volume 3, Issue 5. Pp.17-20.*

Rostow, W. W (1960). The stage of Economic Growth: *A non-communist Manifesto London Cambridge University Press.*

Samuelson, T. and Nordhaus, Y. (2003). Economic Grow.th in a Cross Ssection of Ccountries. *Journals of Economics 106(2), pp.407-43.*

Solow, R.M (1956). Contribution to the theory of economic growth. The *Quarterly Journal of Economics*, Vol. 70, No. 1 (Feb., 1956), pp. 65-94

Soumya M. and Elumalai K. (2015). Effect of Rural Infrastructure on Agricultural Development: District Level Analysis in Karnataka. The Institute for Social and Economic Change, Bangalore. ISBN 978-81-7791-201-2

Stephen, Y. (2015). Influence of road transportation infrastructure on rural agricultural development in the Jaman South District of the Republic of Ghana. *A Thesis submitted to the School of Graduate Studies, Kwame Nkrumah University of Science and Technology.*

Soumya Manjunath and E, Kannan (2017). Effects of Rural Infrastructure on Agricultural Development. *Journal of Infrastructure Development, Indian Development Foundation,* Vol. 8(2): 113-126

Suryani, E., Sri, H., Bonar, M., Sinaga, S. and Sumaryanto, B. (2015). Impacts of road infrastructure on the supply of output and the demand for inputs in food crops in Indonesia*. G.J.C.M.P., Vol.4 (2): pp.68-77*

Todaro, M. P. and Smith, S. (2003)*. Economic Development. 10th Edition, Pearson Education Ltd, London.*

Watson, M. (2013). Agricultural infrastructure development imperative for sustainable food production: a Zimbabwean perspective. *Russian Journal of Agricultural & Socio-Economic Sciences, 24(12). Pp.123-134.*

World Bank. (2007). The World Bank Annual Report 2007, DC.

World Bank (2017). Annual Data Report. Available from https://data.worldbank.org/country/

Yasuyuki Sawada (2015). The Impacts of Infrastructure in Development: A Selective Survey No. 511